

# MX705010A

Wi-SUN PHY Measurement Software

MS2690A/MS2691A/MS2692A/MS2830A  
Signal Analyzer

## Product Introduction

# MX705010A Wi-SUN PHY Measurement Software

Version 3.0  
November 2014

**Anritsu Corporation**

# What is Wi-SUN PHY Measurement Software?

This PC software supports use of a signal analyzer for evaluating the PHY layer (802.15.4g PHY) of Smart Utility Network wireless communications (Wi-SUN).

◆ This software supports the following tests:

- Wi-SUN PHY Transmitter Test
- Wi-SUN PHY Receiver Test
- TELEC-T245 Test

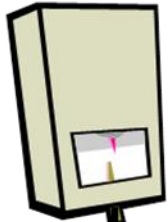
◆ The following signal analyzers are supported:

- MS2690A/MS2691A/MS2692A
- MS2830A

The signal analyzer is controlled by remote commands from this PC software to perform efficient RF tests of Wi-SUN devices, showing its usefulness in improving R&D efficiency!

# What is Wi-SUN PHY Measurement Software?

**Device**



This software remotely controls the signal analyzer connected to the PC via USB cable

**RF**

**Signal Analyzer  
MS269xA/MS2830A**



**Wi-SUN PHY  
Measurement Software**



**USB cable**

# Product Composition

## ■ MX705010A Wi-SUN PHY Measurement Software

Model	Name	Explanation
MX705010A	Wi-SUN PHY Measurement Software	Performs measurements using remote control of signal analyzer by remote commands

## ■ Measuring Instrument

One MS269xA or MS2830A can be used.  
(Firmware V6.01.00 or newer)

[Recommended options]

### ■ MS2690A/MS2691A/MS2692A

⇒ MX269017A, MS269xA-020, MX269902A

### ■ MS2830A

⇒ MS2830A-002, MS2830A-006, MX269017A,  
MS2830A-020 or -021, MS2830A-022, MS2830A-027, MX269902A

# Product Composition

[Configuration Examples]

## ■ MS269xA

Model	Name	Remarks
MS2690A MS2691A MS2692A	Signal Analyzer	V6.01.00 or newer Choose one of them.
MX269017A	Vector Modulation Analysis Software	V6.01.00 or newer
MS2690A-020 MS2691A-020 MS2692A-020	Vector Signal Generator (125 MHz to 6 GHz)	Choose one of them.
MX269902A	TDMA IQproducer	

## ■ MS2830A

Model	Name	Remarks
MS2830A	Signal Analyzer Main Frame	V6.01.00 or newer
MS2830A-040 MS2830A-041 MS2830A-043	3.6 GHz Signal Analyzer 6 GHz Signal Analyzer 13.5 GHz Signal Analyzer	Choose one of them. The MS2830A-041 or -043 (6 GHz or 13.5 GHz option) is required to measure 900-MHz band fifth-order harmonics.
MS2830A-002	High Stability Reference Oscillator	
MS2830A-006	Resolution Bandwidth 10 MHz	
MX269017A	Vector Modulation Analysis Software	V6.01.00 or newer
MS2830A-020 MS2830A-021	3.6 GHz Vector Signal Generator 6 GHz Vector Signal Generator	Choose one of them.
MS2830A-022	Vector Signal Generator Low Power Expansion	
MS2830A-027	Vector Signal Generator ARB Memory Expansion 256 Msa	
MX269902A	TDMA IQproducer	

# Operating Environment/Related Standards

## ■ Operating Environment (MX705010A)

Item	Explanation
OS	Windows® 7 Professional SP1 or newer
Memory	4 GB minimum
HDD Free Space	80 GB minimum
Display Resolution	WXGA 1280 × 768 or more
USB I/F	USB 2.0 Requires PC with two USB ports for operation as host ✓ For remote control of signal analyzer and insertion of license dongle ✓ Use of other USB equipment requires PC with three USB ports PC: A type, Signal Analyzer: B type USB cables are not provided with this software.
Software	Microsoft Excel 2010 or Microsoft Excel 2013
National Instruments NI-488.2	NI-VISA V3.1.1 or newer must be installed.

## ■ Related Standards (MX705010A)

No.	Explanation
1	Wi-SUN Alliance Test and Certification Working Group (TCWG) IEEE 802.15.4g PHY Conformance Test Suite Specification Revision 1V08
2	TELEC-T245 Version 4.0 Specified low-power radio equipment for telemeter, telecontrol or data transmission (920 MHz band)

# Measurements: Wi-SUN PHY TX Test

Test No.	Test Item	Test Contents
1	Modulation Quality	The two modulation quality parameters specified in the FSK modulation Eye diagram are measured to evaluate whether the quality is within the standards or not. Whether the frequency deviation error and zero crossing offset are within the permissible range or not is specified.
2	Transmitter Frequency Offset	The offset of the specified transmission frequency (channel center frequency) is measured to evaluate whether it is within range or not.
3	Transmitter Adjacent Channel Power Ratio	The leakage power at 4 points adjacent to the specified channel is measured to evaluate whether it is within the specified range or not.
4	Test Vectors	The sent frames are analyzed to evaluate whether they are in the expected format or not.



# Measurement Items: Wi-SUN PHY RX Test

Test No.	Test Item	Test Contents
1	Receiver Sensitivity Test	<p>The RX sensitivity is tested and the results evaluated (PER measurement).</p> <p>The specified number of packets are output from the Vector Signal Generator at the specified output level. After transmission is completed, receipt of the packets by the Wi-SUN device is confirmed and these results are input to this software.</p>
2	Packet Test	<p>The RX sensitivity is tested and the results evaluated (PER measurement).</p> <p>The frame size is 20 octets.</p> <p>The specified number of packets are output from the Vector Signal Generator at the specified output level. After transmission is completed (specified number of frames), receipt of the packets by the Wi-SUN device is confirmed and these results are input to this software.</p>

Adjacent/Alternate Channel Rejection Ratio is not supported. Moreover, at test execution, in addition to a signal analyzer with a built-in signal generator, a signal generator for outputting the interference wave is also required.

This software can also perform BER measurement to confirm RX performance. If the Wi-SUN device can output Data and Clock signals, this software can perform BER measurement in linked operation with the signal analyzer with installer BER measurement option\* for BER evaluations. However, BER measurement is not specified in the Wi-SUN PHY tests.

\*MS2690A/MS2691A/MS2692A-020 Vector Signal Generator installed in MS2690A/MS2691A/MS2692A Signal Analyzer

\*MS2830A-026 BER Measurement Function (option) installed in MS2830A Signal Analyzer

# Measurements: TELECOM-T245 Test

Test Number	Test Items	Test Contents
1	Frequency Tolerance	The TX frequency tolerance is measured to evaluate whether it is within the standard or not.
2	Occupied Bandwidth (OBW)	The TX frequency occupied bandwidth is measured to evaluate whether it is within the standard or not.
3	Unwanted Emission	The strength of the spurious emissions or unwanted emissions is measured to evaluate whether it is within the standard or not.
4	Antenna Power Tolerance	The antenna power and antenna power offset are measured to evaluate whether they are within the standard or not*1.
5	Adjacent channel leakage	The adjacent channel leakage power is measured to evaluate whether it is within the standard or not.
6	Secondary Unwanted Emission	The secondary unwanted emission is measured to evaluate whether the limits are within the standards or not.
7	TX Time Control Equipment	The TX time and TX downtime are measured to evaluate whether they are within the standards or not.
8	Carrier Sense Function	The interference is measured to evaluate whether the carrier sense operation is within the permissible range.

\*1 Antenna Power Tolerance is measured using the spectrum analyzer function.

# Functions and Features (1/5)

## Key Operation Main Screen

- Executes tests by touching toolbar icons
- Easy to understand test sequence and results displays at Main screen

The screenshot shows the main interface of the MX705011A Wi-SUN PHY Conformance Test Software. The interface is divided into several windows:

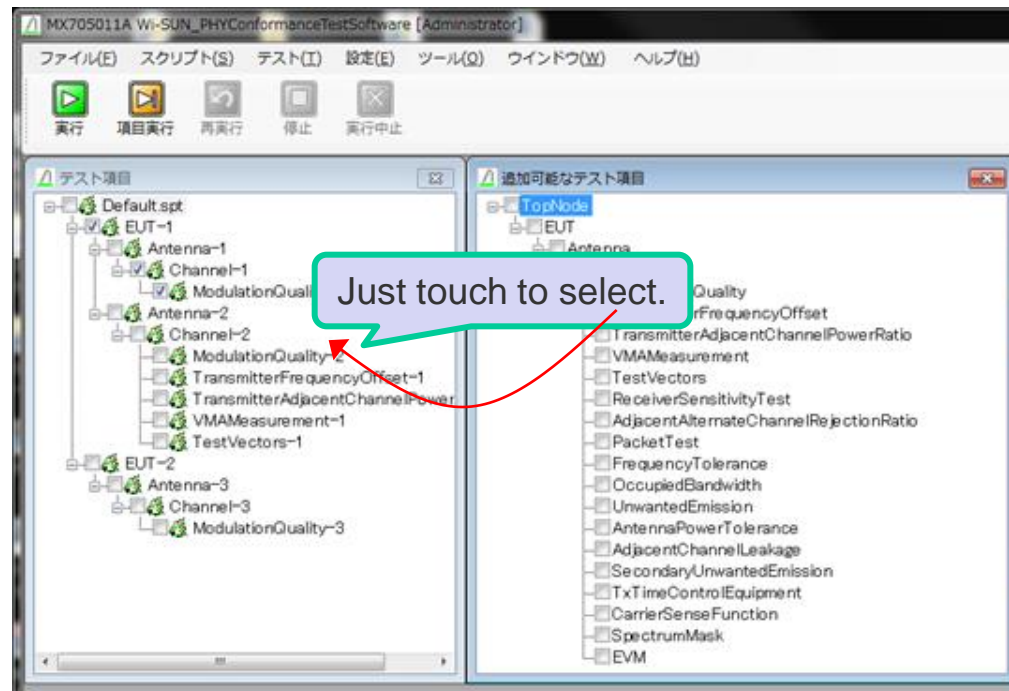
- Status Window:** Displays the current status, which is "PASS".
- Test Info Window:** Displays data related to test conditions, including Start Date (2014/01/10), IMSI, IMEI, and UE Power Class.
- Graph Window:** Displays test results as a graph, showing a signal waveform.
- Test Report Window:** Displays test results in a table format.
- Script Window:** Displays test scripts, including Default.spt, EUT-1, Antenna-1, Channel-1, ModulationQuality-1, Channel-2, ModulationQuality-2, TransmitterFrequencyOffset-1, TransmitterAdjacentChannelPow, VMAMeasurement-1, TestVectors-1, EUT-2, Antenna-3.

Judgment	Position	Mode	Band	Option	Channel	Test Name	Parameter	Data	Unit	Low
Low		PatternA	9	1	920800000	Channel	ChannelSpa...	200000		
Low		PatternA	9	1	920800000	Channel	Modulation...	1.0		
Low		PatternA	9	1	920800000	Channel	DataRate	500		
Low		PatternA	9	1	920800000	Modulation...	Receive ban...	2000	Hz	
Low		PatternA	9	1	920800000	Modulation...	Jitter P-P ...	0.0	%	
Low		PatternA	9	1	920800000	Modulation...	Jitter P-P ...	0.0	%	
Low		PatternA	9	1	920800000	Modulation...	RMS_fdev	0.0	%	
Low		PatternA	9	1	920800000	Modulation...	ZeroCrossin...	0.0	%	

# Functions and Features (2/5)

## High Operability/Visibility using Script Editing Window

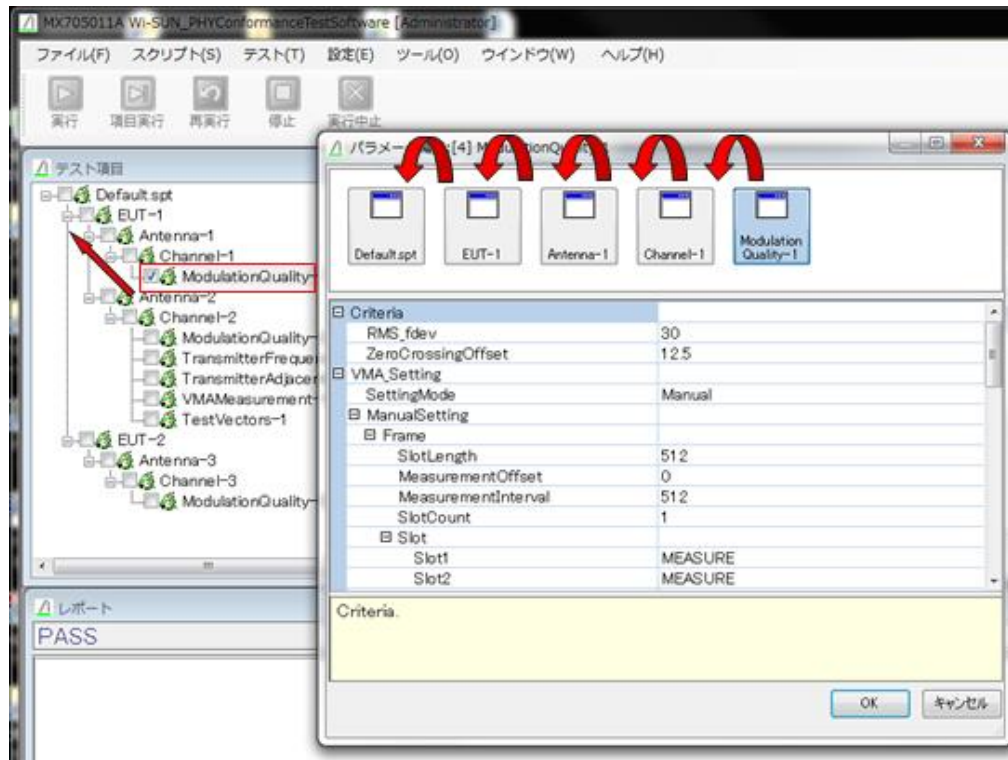
- Test items are displayed as a tree format at an easy to use setting screen for a clear understanding of the relationship between test items and parameters.
- Checkboxes permit simultaneous selection of multiple test items



# Functions and Features (3/5)

## Parameter Editing using Tab Displays

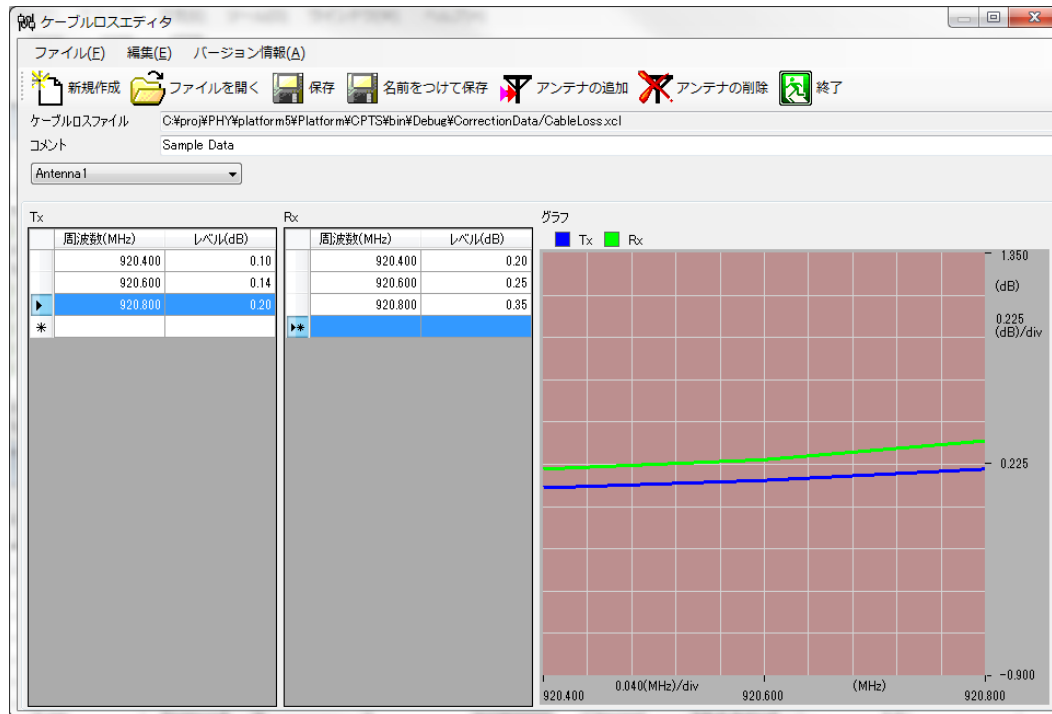
- Test item and parameter settings can be checked on the same screen using Tab displays for easy editing.



# Functions and Features (4/5)

## Loss Settings using Cable Loss Editor

- Loss settings matching the cable frequency characteristics can be input for both TX and RX tests.
- Loss between input points is calculated automatically by linear interpolation.



# Functions and Features (5/5)

## Output Measurement Results File

- The Wi-SUN IEEE802.15.4g PHY Conformance Test measurement results can be output as either HTML or CSV format files.

**Outputs measurement results in HTML format**

**Performs general evaluation of test results**

**Outputs measurement results in CSV format**

**Displays measurement results for each test item**

**Outputs measurement results as waveform display**

Step	Pass	Fail	Test Name	Parameters	Data	Unit
1	PASS		Antenna	FCS	1Bys	Hz
2	PASS		Antenna	Profile	FAN	Hz
3	PASS		Antenna	DUT_SignalLevel	0	dBm
4	PASS		Channel			Hz
5	PASS		Channel			Hz
6	PASS		Channel			Hz
7	PASS		Channel			Hz
8	PASS		Channel			Hz
9	PASS		Channel			Hz
10	PASS		Channel			Hz
11	PASS		Channel			Hz
12	PASS		Channel			Hz
13	PASS		Channel			Hz
14	PASS		Channel			Hz
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95	PASS		Channel			Hz
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98	PASS		Channel			Hz
99	PASS		Channel			Hz
100	PASS		Channel			Hz

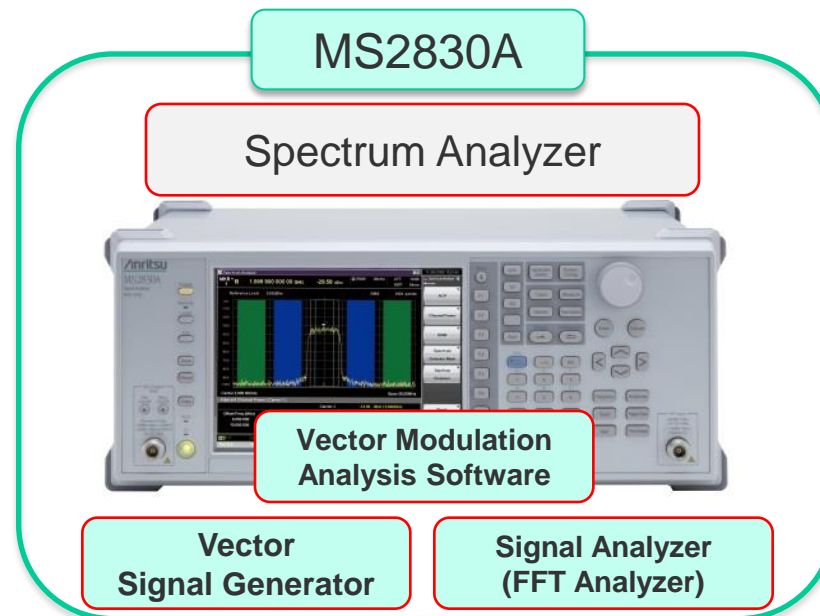
# What is a Signal Analyzer?

## Evaluation of Wireless Module TX and RX Characteristics MS2830A Certified by Wi-SUN Alliance for PHY Conformance Tests

The MS2830A Signal Analyzer is based on a sweep type spectrum analyzer; installing various options supports different measurements meeting customers' needs.

For example, using the MX269017A Vector Modulation Analysis software for TX tests supports modulation analysis Wi-SUN devices. Additionally, using the signal analyzer functions (FFT Analysis) permits observation of changes in the TX signal spectrum in the time domain. The signal analyzer functions play a key role in understanding and evaluating changes in the spectrum of burst signals sent especially from Wi-SUN devices. Since TX signals from Wi-SUN devices can be saved (digitized), protocol analysis can be performed\* using the saved data.

A Wi-SUN modulation waveform can be output from the built-in Vector Signal Generator (option) for Wi-SUN RX tests. In other words, the MS2830A is the ideal all-in-one platform for TX and RX evaluations of Wi-SUN devices.



\*Use the MX705110A Wi-SUN Protocol Monitor software to evaluate Wi-SUN device protocols.



# Note

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